Please amend the paragraph beginning on page 4, line 4, as follows (Amended Once):

a1

Figure [2A] 2 shows a powerboat hull profile, depicting a central displacement body and tapered outer skirts that capture the bow wave, and the line of the planing wings that suppress and recapture wave energy.

Please amend the paragraph beginning on page 4, line 7, as follows (Amended Once):

a2

[Figure 3 shows] <u>Figures 3A-C</u> show the powerboat hull section, depicting the central displacement body with wing channels and tapered outer skirts to capture and suppress the bow wave. Figure 3A shows twin motors in the wing channels; Figure 3B shows twin motors on the displacement body; and Figure 3C shows a single motor on the displacement hull.

Please amend the paragraph beginning on page 5, line 1, as follows (Amended Once):

a3

Referring initially to FIGS. 1 and 2, the present invention provides a powerboat comprising an "M-shaped" hull 1 having a fore end 2, and aft end 3, and a longitudinal axis <u>(designated by a reference number A in FIG. 1)</u> extending between the fore end 2 and the aft end 3. The hull 1 comprises a displacement body 16, which is preferably relatively narrow and centralized, and two downwardly extend outer skirts [18] <u>in the form of a port skirt 18A and a starboard skirt 18B</u>. The outer skirts [18] <u>18A and 18B</u> are preferably generally parallel. The displacement body 16 provides displacement lift for efficient operation at low speeds. [Each of

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the] The outer skirts [18] 18A and 18B [is] are located on either side of the displacement body 16 [.], the port skirt 18A being located on a port side of the displacement body 16 and the starboard skirt 18B being located on a starboard side of the displacement bogy 16 as illustrated in FIG 1 Lateral extensions of the watercraft deck outward from the central displacement body 16 form two planing wings [20.] , a port planing wing 20A and a starboard planing wing 20B The planing wing line 21 is shown in FIG. 2. The outer skirts [18] 18A and 18B are connected to the displacement body 16 by the planing wings [20,] 20A and 20B [which have] to form first and second channel-defining structures that

Q3 contd

define first and second (i.e., port and starboard) wing channels [14] 14A and 14B. The bow waves 10 and the smaller skirt waves 12 are directed into the wing channels [14] 14A and 14B, wherein the waves undergo spiral action.

~~Please~~ amend the paragraph beginning on page 5, line 13, as follows (Amended Once):

Q4

The outer (i.e., outboard) surfaces of the outer skirts [18] 18A and 18B are preferably substantially perpendicular with respect to the static waterline 5 FIG. 2 to minimize wave generation. The outer skirts 18A and 18B are also preferably generally arcuate (i.e., curved) on their inner surfaces (i.e., inboard), so as to form arcuate wing channels [14] 14A and 14B with the displacement body 16. Most preferably, the outer skirts [18] 18A and 18B are tapered. In operation, the wing channels [14] 14A and 14B recapture the bow waves 10, thereby protecting other boats and waterway walls and providing effective planing surfaces [22] 22A and 22B for

A4 contd efficient operation at high speed.

Please amend the paragraph beginning on page 5, line 21, as follows (Amended Once):

A5 In preferred embodiments (see FIGS. 3A-C), the cross-sectional surface of each wing channel [14] 14A and 14B is concave with respect to the static waterline 5. More preferably, the cross-sectional surface of each wing channel [14] 14A and 14B at the fore end 2 is generally arcuate. Preferably, the curvature of the cross-sectional surface of each wing channel [14] 14A and 14B is greater at the fore end 2 than at the aft end 3. The curvature preferably progressively decreases from the fore end 2 to the aft end 3. In particularly preferred embodiments, the cross-sectional surface of each wing channel 18A and 18B is generally arcuate at the fore end 2 and generally linear (i.e., "flat") at the aft end 3. The wing channel ceilings [30] 30A and 30B (i.e., apices) are above the static waterline 5 in the fore end 2 and extend downward below the static waterline 5 in the aft end 3.

Please amend the paragraph beginning on page 5, line 30, as follows (Amended Once):

A6 Referring again to FIG. 1, the watercraft of the present invention may have a hull 1 that further comprises two or more downwardly extending inner skirts [26] (a port inner skirt 26A and a starboard inner skirt 26B) attached to either side of the displacement body 16, wherein the outer skirts [18] 18A and 18B flank the inner skirts [26] 26A anal 26B. In certain

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a6 cont'd

embodiments, as described in greater detail below, these inner skirts [26] 26A and 26B can reduce cavitation caused by propeller action.

Please amend the paragraph beginning on page 6, line 4, as follows (Amended Once):

a7

Preferably, the hull 1 further comprises one or more hydrodynamically-shaped serrations [24] 24A and 24B located on the surface of the wing channels [14] 14A and 14B (at the aft end 3) and extending downward below the static waterline 5 (FIG. 1). The one or more serrations are preferably located on the wing channel ceiling (see [30 in FIG. 3] reference numerals 30A and 30B in FIGS. 3A-C). Alternatively, the hull may further comprise one or more hydrodynamic serrations 25 FIG. 1 located on the surface of the displacement body 16 and extending downward below the static waterline 5. The serrations [24] 24A. 24B. and 25 provide wake control. To more effectively disperse both the remaining bow wave energy exiting from the wing channels [14] 14A and 14B and the propeller wake energy, the hydrodynamically-shaped serrations are preferably mounted under, and extend forward of, the transom which is generally aligned with the outer and inner skirts and propeller(s) discharge. This design disperses the wave flow and increases the mixing of air and water, with the air dampening the transmission of energy in the water, thereby further reducing the threat to other boats or damage to structures at the water/land interface.

Please amend the paragraph beginning on page 6, line 18, as follows (Amended Once):

`The present invention also provides in certain embodiments a watercraft wherein upon

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a8 cont'd

forward movement of the watercraft through a body of water, the waves generated by the displacement body 16 and the outer skirts [18] 18A and 18B are substantially directed into the wing channels [14] 14A and 14B, resulting in substantial wave suppression.

Please amend the paragraph beginning on page 6, line 22, as follows (Amended Once):

a9

The watercraft of the present invention may be a powerboat (as illustrated in [FIGS. 1-3] FIGS. 1. 2. and 3A-C) or a sailboat (as illustrated in [FIGS. 4-7] FIGS. 4. 5. 6A-C. and 7). Where the watercraft is a powerboat, the watercraft preferably comprises a mechanical propulsion system. The mechanical propulsion system may be an internal combustion system, an electrical system, a compressed air system, or a combination thereof. Preferably, the mechanical propulsion system comprises one or more propellers. Referring to [FIG. 3] FIGS. 3A-C, the propeller(s) 50 may be located on the displacement body 16 (see FIGS. 3B and 3C) or on a planing wing (e.g., in a wing channel). In the case where the propellers are located in the wing channels (see FIG. 3A), it is preferred that there be two propellers, wherein each of the two propellers is located in a wing channel [14] 14A or 14B.

Please amend the paragraph beginning on page 7, line 1, as follows (Amended Once):

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Twin propellers 50 mounted below the wing channels [14] 14A and 14B provide efficient propulsion and maneuvering at lower speeds, as in FIG. 3A. However, with increased

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speeds, the turbulent air/water mixture, which is desirable for lift efficiency in the wing channels [14] 14A and 14B, also creates propeller cavitation. To resolve this cavitation problem, the air/water mixture flowing through the wing channels [14] 14A and 14B can be isolated for increased lift efficiency by installing two inner skirts [26] 26A and 26B (preferably generally perpendicular to the static waterline 5 and parallel to the outer skirts 18A and 18B), as illustrated in FIG. 1. Preferably, the inner skirts [26] 26A and 26B are faired into the central displacement body 16 near the point of its maximum beam and extend beyond the propeller(s), thereby forming an inner wall to contain the air/water mixture. This inner skirt design assures solid water flow under the central displacement body 16 in which either a single (see FIG. 3C) or twin propellers (see FIG. 3B) may operate efficiently at higher speeds without cavitation. For propellers mounted on the central displacement body 16, satisfactory boat maneuvering may be achieved with a large single rudder directly aft of a single propeller or twin rudders mounted in the discharge from the two propellers, in either case mounted forward of the transom. Alternatively, where two propellers are used, maneuverability may be controlled by separate control of speed and direction of rotation for each propeller.

a10

Please amend the paragraph beginning on page 7, line 18, as follows (Amended Once):

Having described the structure of various preferred embodiments of the present invention, the operation of such watercraft is described below. In operation, the bow waves 10, which are moved forward by the boat at its speed, are forced into the wing channels [14] 14A and 14B and given a spiral motion by the concave surface of the wing channels [14] 14A

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and 14B. The water then spirals back through the wing [channel] channels with reduced angularity as its forward speed is slowed by friction. Air near the entrance to the wing channels, increasing in pressure with boat speed, is entrapped in the water spiral which acts as screw conveyor, moving the air with the water in a spiral pattern through approximately the first two-thirds of the length of the wing [channel 14] channels 14A and 14B referred to as the "spiral action." Although its speed is reduced by friction, the air/water mixture continues to move forward in relation to water outside the wing channels. This water action contributes to efficient planing lift of the ceilings of the wing channels, with the air content also providing a benefit in reduced friction drag.

a11 contd

Please amend the paragraph beginning on page 8, line 1, as follows (Amended Once):

As the air/water mixture leaves the "spiral section" (see reference numeral 14 in FIG. 1), it passes into the final approximately one-third of the wing channel that, in certain preferred embodiments, becomes increasingly rectangular with a flattening (e.g., decreased curvature) of the wing channel ceiling. The wing channel ceilings slope downward to below the static waterline 5, reducing and ultimately eliminating the cross-sectional area, thereby increasing the pressure of the air/water mixture. These changes in what is referred to as the "pressure section" (see reference numeral 22 in FIG. 1) eliminate the spiral flow and force separation of the air which rises towards the wing channel ceiling due to its lower specific gravity. The water, under increasing pressure, compresses the air layer at the wing channel ceiling, thereby providing efficient low-drag planing lift. Finally, the compressed air/water mixture exits under

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a12 the transom as low energy foam, while the lower solid water layer, from which much of the energy has been extracted in compressing the air, exits the transom below the foam.

Please amend the paragraph beginning on page 8, line 14, as follows (Amended Once):

As mentioned above, the hull design provided by the present invention can also be adapted for use in a sailing vessel, as shown in FIGS. 4-7. A sailboat design incorporating an "M-shaped" hull 100 having a sailing mast 101 is illustrated in FIG. 4. Referring to FIGS. 4-7, such a sailboat has the following features:

a13

1. A narrow displacement body 116 for efficient sailing at low speeds;
2. Planing wings [120] 120A and 120B with ceilings [130] 130A and 130B to provide stability from bow waves 112 and to promote planing;
3. Righting moment from the lift on the lee-side bow wave 112a on the wing ceiling 130B, which increases with boat heel (lesser bow wave 112b and greater bow wave 112a , which increases the righting moment, are shown in FIG. 7)
4. Outer skirts [118] 118A and 118B (preferably tapered) to contain the bow wave [112] and provide automatic adjustment of side force with heel and increasing immersion of the skirt having a curved tip to enhance side force (see FIG. 7); and

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